

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

11/13/03
Appeal Brief
A. Smith
11/13/03
[Signature]

Applicant : BORGEN, et al.
Appl. No. : 09/916,256

Filed : July 30, 2001
Title : DOUBLE DISCONNECT ASSEMBLY FOR
MULTI-AXLE VEHICLES

Group Art Unit : 3611
Examiner : YEAGLEY, Daniel

Docket No. : 08200.495

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APPELLANT'S BRIEF UNDER 37 C.F.R. § 1.192

November 05, 2003

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In follow-up to the Notice of Appeal filed September 05, 2003, Appellant respectfully requests the Board of Patent Appeals and Interferences consider the following arguments and reverse the decision of the Examiner in whole.

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(1) Real Party in Interest

The real party in interest is Spicer Technology Inc., who is the assignee of the instant invention.

(2) Related Appeals and Interferences

None.

(3) STATUS OF CLAIMS

1. Claims 1-21 were originally filed with the specification on July 30, 2001.

2. A Written Restriction Requirement was mailed August 12, 2002 requiring an election of one of the following groups of inventions:

- group I: apparatus claims 1-18; or
- group II: method claims 19-21.

The Examiner also required an election of the following species:

- species A, drawn to figures 1-4; and
- species B, drawn to figures 5-6.

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3. On September 12, 2002, Applicant filed a Response to Written Restriction Requirement electing Group I (claims 1-18) and Species A (figures 1-4). Applicant noted that claims 1-6 and 10-18 were generic to Species A and B, and that claims 1-8 and 10-18 are readable on the elected embodiment.

4. In the Official Action dated December 12, 2002, the Examiner objected to the drawings and specification for minor informalities. Original claims 1-8 and 10-18 were rejected under 35 U.S.C. §112, second paragraph, for indefinite claim language. Claims 1-8 and 10-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Balmforth (US 4,914,979) (hereinafter referred to as Balmforth '979) in view of Hunt (US 5,996,720) (hereinafter referred to as Hunt '720).

3. On March 12, 2003, Appellant filed Amendment presenting amendments to the specification and claims as well as arguments for the patentability of claims 1-8 and 10-18. Appellant also added a new claim 22.

4. In the Official Final Action dated May 07, 2003, the Examiner objected to the specification for several minor informalities related to inconsistent terminology between the specification and claims.

The Examiner objected to claim 18 for using the term "whereby".

Claims 1-8, 10-18 and 22 were rejected under 35 U.S.C. §112, second paragraph, for indefinite claim language.

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The Examiner rejected claims 1, 2, 4, 13 and 18 as being rejected under 35 U.S.C. §102(e) as being anticipated by Balmforth '979.

The Examiner also rejected claims 3, 5-8, 10-12, 14-17 and 22 under 35 U.S.C. § 103(a) as being unpatentable over Balmforth '979 in view of Hunt '720.

The Examiner made this Official Action "Final".

5. On August 07, 2003, Appellant filed Amendment and Request for Reconsideration amending the specification and claims. Specifically, the specification was amended to address the objections made in the Final Action, and the claims were amended to address the §112 issues noted by the Examiner in the Final Action.

Appellant also amended independent claim 1 to include the limitations of claim 22 and presented arguments for the patentability of claims 1-8 and 10-18.

6. On August 20, 2003, the Examiner issued an Advisory Action indicating that claims 1-8 and 10-18 were rejected while claims 9 and 18-21 were withdrawn from consideration.

7. On September 05, 2003, Appellant filed a Notice of Appeal.

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(4) STATUS OF AMENDMENT

On August 07, 2003, Appellant filed an after-final Amendment and Request for Reconsideration. The Advisory Action mailed on August 20, 2003 indicated that Appellant's after-final Amendment would be entered, and the Advisory Action indicated that claims 5, 14, 17 and 18 were still rejected under 112 second paragraph.

Concurrent with this Appeal Brief, Appellant filed an amendment amending the (dependency of claim 14) and (amending claim 17.)

Subsequent to the Advisory Action, there have been no other papers issued by the U.S.P.T.O.

(5) SUMMARY OF THE INVENTION

This invention is a system whereby axles of a tandem or multi-axle vehicle may be easily and quickly engaged and disengaged as required. The present invention allows the ring gear and differential gears to remain stationary when the axle is disengaged.

In multi-axle vehicles such as illustrated in Figure 1, a dual disconnect mechanism is contained in the front axle 1 and auxiliary rear axle 7. When only the primary rear axle 4 is necessary to propel the vehicle (e.g., during highway use) the transfer case 3 interrupts torque to the front axle 1. Similarly, a clutch 6 also interrupts torque transmission to the auxiliary rear axle 7. In this mode, the dual disconnect mechanism of this invention prevents the output shafts of the front axle 1 auxiliary rear axle 7 from back-driving their respective differentials 2, 8, thereby reducing parasitic losses and wear.

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This invention comprises a differential having first and second side gears 20 and 21, which are rotatable about a common transverse axis. Rotatable first and second output shafts 24, 25 are co-axial with the side gears 20 and 21, and a clutch mechanism (36, 38, 40, 41) is used for placing the output shafts 24, 25 simultaneously into or simultaneously out of driving engagement with the respective side gears 20, 21. An actuator is used to slidably and concurrently move the driven axles 24, 25 between the clutch engaging position and the clutch disengaging position.

According to one important aspect of this invention, the first and second axle shafts 24, 25 are interconnected and axially slidable together as a unit. In other words, the present invention preferably provides a linking member 29 in the form of a linking rod or other suitable member that extends through the differential assembly to connect the two axle shafts 24, 25. With this arrangement, the invention provides simultaneous axial movement of the axle shafts to thereby mutually disconnect the first and second axle shafts 24, 25 from the first and second side gears 20, 21. In the embodiment of Figures 2 and 3, the linking rod passes through the cross pin 16. In the alternate embodiment of Figure 5, the linking member 129 takes the form of a connecting sleeve that connects the axle shafts 24, 25. In the arrangement of Figure 5, the cross pin 16 passes through the connecting sleeve 129 at apertures 130. In both illustrated designs, the two driven axle shafts 24, 25 are securely linked together to provide mutual linear sliding movement between the clutch engaged and disengaged positions.

The dual disconnect differential assembly of this invention includes a clutch mechanism for simultaneously placing both output shafts 24 either into or out of driving

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engagement with respective side gears 20, 21. The splines 22, 23 on respective side gears 20, 21 form part of this clutch assembly or mechanism.

(6) ISSUES

1. Whether claims 1-8 and 10-18 are patentable over Balmforth '979 in view of Hunt '720.

(7) GROUPING OF THE CLAIMS

withdrawn
Claims 1-4, ⁹ stand and fall together.

Claim 5, 6 and 11-17 stand and fall together.

Claim 7 stands alone.

Claim 8 stands alone.

Claim 10 stands alone.

Claim 18 stands alone.

(8) ARGUMENTS

Sub-paragraph (i)

*Claim 5-8, 11, 12
Rejected because claim 5
now lacks antecedent basis*
This sub-paragraph is not applicable to the instant appeal in so far as there are no rejections under 35 U.S.C. § 112, first paragraph.

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Sub-paragraph (ii)

Appellant filed an amendment concurrently with this Appeal Brief to eliminate all rejections under 35 U.S.C. § 112, second paragraph. Thus, sub-paragraph (ii) is not applicable to the instant appeal in so far as there are no rejections under 35 U.S.C. § 112, second paragraph.

Sub-Paragraph (iii)

Appellant has amended independent 1 to include the limitations of claim 22. Thus, this sub-paragraph is not applicable to the instant appeal in so far as there are no rejections under 35 U.S.C. § 102.

Sub-paragraph (iv)

Claims 1-8 and 10-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Balmforth '979 in view of Hunt '720. It is noted that claim 1 is an independent claim, and claims 2-18 depend from claim 1.

Claims 1-4 and 9

None of the prior art documents teach a pair of axle shafts that are axially slidable with respect to a differential assembly as required by independent claim 1.

The Examiner acknowledges that Balmforth '979 fails to teach axially slidable axle shafts (see Final Action, page 6, 5 lines from bottom). The Examiner relies solely on Hunt '720 for a teaching of slidable axle shafts.

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Hunt '720 teaches a slide collar 34, slidable driven gears 30 and slidable clutch collar 36. See column 3, lines 12-65. The axle shafts 24 of Hunt '720 do not slide.

Balmforth '979 teaches a clutch sleeve (see sleeve 73 in Figure 3 of Balmforth '979) and the clutch sleeve 73 includes teeth 77 that mates with teeth 72 on a hollow gear 47. The axle shaft 40 of Balmforth '979 does not slide axially. Significantly, Balmforth '979 states that the differential lock 113 is operable by a mechanism similar to the device shown in Figure 3. In any event, no slidable axle shafts are mentioned.

Neither Hunt '720 nor Balmforth '979 teaches a pair of axially slidable axle shafts. For this reason alone, the Examiner's rejection must fail because the references, alone or in combination, fail to teach or render obvious this feature. Even if you assume the Examiner's combination is proper, the slidable axles are still lacking from the Examiner's rejection.

Absent both a teaching of a slidable axle shaft and motivation to alter Balmforth '979, the Examiner cannot make the two-part leap made in the final rejection.

Additionally, modification suggested by the Examiner would destroy the function of Balmforth '979 if one of skill in the art modifies Balmforth '979 to include a pair of slidable axle shafts. It is not possible to include a slidable axle shaft (or two) with the structure of Balmforth '979.

The Examiner fails to prove as to why one having ordinary skill in the art would have found the claimed invention to be obvious in light of the teachings of Balmforth '979 and Hunt '720. Examiner's statement that modifications of Balmforth '979 to meet the claimed invention would have been obvious to one having ordinary skill in the art at the time the invention was made, because the axially slidable shafts were known in the art, is factually

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erroneous and is not sufficient to establish *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993).

MPEP 2143.01 specifically states that “a statement that modifications of the prior art to meet the claimed invention would have been “ ‘well within the ordinary skill of the art at the time the claimed invention was made’ “ because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references.” *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). See also *In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1318 (Fed. Cir. 2000)”.

Here, the prior art lacks the claimed feature of sliding axle shafts set forth in claim 1.

MPEP 2143.01 further states that the mere fact that references can be combined does not render the resultant combination obvious unless the references suggest the desirability of the combination, citing *In Re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). There is no suggestion to support the Examiner’s assertion.

Moreover, as stated in *In re Kotzab*, 217 F.3d 1365, 1369-70, 55 USPQ2d 1313, 1316 (Fed. Cir. 2000):

Most if not all inventions arise from a combination of old elements. Thus, every element of a claimed invention may often be found in the prior art. However, identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. Rather, to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the

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desirability of making the specific combination that was made by the applicant [citations omitted].

Therefore, the rejection of claim 1 under 35 U.S.C. 103(a) as being unpatentable is improper.

Claim 5, 6 and 11-18

Claim 5 requires an assembly where the axle shafts are “interconnected to provide simultaneous axial movement of said axle shafts to thereby mutually disconnect said first and second axle shafts from said first and second side gears.” Claims 11-18 set forth specific structural features of the clutch actuator and splined interface between the slidable axle shafts and the side gears. The prior art fail to teach or render obvious these claimed arrangements.

Claim 7

Claim 7 requires an interconnecting member comprising “a rod (19) extending from an inboard end of said first axle shaft to an inboard end of said second axle shaft”, and claim 8 specifies that the “rod passes through said cross pin” (16). Since the prior art fails to teach interconnected axle shafts, this specific interconnection assembly is likewise not found in the prior art.

Claim 10

Claim 10 recites the clutch interface between the first and second axle shafts and the first and second side gears, which again is not found in the prior art.

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Sub-paragraph (v)

This sub-paragraph is not applicable to the instant appeal in so far as the final rejection does not raise any issues other than those referred to in sub-paragraphs (i)-(iv).

Conclusion

The foregoing arguments detail the failure of the Examiner's 35 U.S.C. §103(a) rejection to survive scrutiny under the requirements of such rejections. Thus, the Examiner's rejections should be reversed and such a decision by the Board is respectfully sought.

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(9) APPENDIX

1. (previously amended) A double disconnect assembly in a drive assembly of a motor vehicle comprising:

a first drive axle;

a second drive axle driven by a drive train;

a first clutch assembly for selectively engaging and disengaging said drive train; and

a second clutch assembly for selectively engaging and disengaging first and second axle shafts of said second drive axle from a differential assembly,

wherein said first and second axle shafts are axially slidable with respect to said differential assembly.

2. (previously amended) The double disconnect assembly according to claim 1, further comprising a primary rear drive axle, wherein said drive train is an auxiliary rear prop shaft and said second drive axle is an auxiliary drive axle of a tandem vehicle.

3. (previously amended) The double disconnect assembly according to claim 1, wherein, when said first and second clutch assemblies are in a nonengaged condition, said differential assembly is in a non-rotating state.

4. (previously amended) The double disconnect assembly according to claim 1, wherein said differential assembly comprises pinion gears rotatably mounted with respect to a cross pin, first and second side gears being rotatable about a common transverse axis, and said first and second axle shafts which are co-axial with said first and second side gears, respectively.

Amended AFTER Prior art
5. (previously amended) The double disconnect *112 Antecedent basis* system according to claim 4, wherein said first and second axle shafts are axially slidable and interconnected to provide simultaneous axial movement of said axle shafts to thereby mutually disconnect said first and second axle shafts from said first and second side gears.

6. (previously amended) The double disconnect assembly according to claim 5, further comprising an interconnecting member interconnecting said first and second axle shafts to translate simultaneously along said transverse axis.

7. (original) The double disconnect assembly according to claim 6, wherein said interconnecting member comprises a rod extending from an inboard end of said first axle shaft to an inboard end of said second axle shaft.

8. (original) The double disconnect assembly according to claim 7, wherein said rod passes through said cross pin.

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9. (withdrawn) The double disconnect assembly according to claim 6, wherein said interconnecting member comprises an connecting sleeve adapted to receive said cross pin passing therethrough, said connecting sleeve extending between and connecting said first and second axle shafts.

10. (original) The double disconnect assembly according to claim 4, further comprising:

first clutch members on said first and second side gears; and

second clutch members on said first and second axle shafts for engaging said first clutch members of respective first and second side gears.

11. (previously amended) The double disconnect assembly according to claim 5, further including a clutch collar which is mounted on one of said first and second axle shafts for axially moving said first and second axle shafts simultaneously in the same direction between a clutch engaging position and a clutch disengaging position.

12. (previously amended) The double disconnect assembly according to claim 11, further including an actuator, wherein said actuator includes an arm for engaging said clutch collar for slidably moving said first and second axle shafts between said clutch engaging position and said clutch disengaging position.

13. (previously amended) The double disconnect differential assembly according to claim 4, wherein outer surfaces of said first and second axle shafts and inner surfaces of said first and second side gears have complementary splines.

Concurrent Amendment

**
Not
Amended*

14. (previously amended) The dual disconnect differential assembly according to claim ¹⁰4, wherein said first and second side gears have axially extending central bores, said first clutch members on said first and second side gears are splines formed on portions of said bores, said second clutch members on said first and second axle shafts are splines formed on outer surfaces thereof, the splines on said first and second side gears and the splines on said first and second axle shafts being in engagement when said first and second axle shafts are in a clutch engaging position and out of engagement when said first and second axle shafts are in a clutch disengaging position.

*claim 10
has clutch
members*

15. (original) The dual disconnect differential assembly according to claim 14, wherein a compression spring urges said first and second axle shafts toward one of said clutch engaging position and said clutch disengaging position.

16. (original) The dual disconnect differential assembly according to claim 15, wherein said compression spring urges said first and second axle shafts toward said clutch disengaging position.

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concurrent amendment
17. (original)

The dual disconnect differential assembly according to claim 4, wherein said first and second axle shafts are in driving engagement with said first and second side gears when said first and second axle shafts are in a clutch engaging position and are in a free-wheeling mode when said first and second axle shafts are in a clutch disengaging position.

18. (original) The dual disconnect differential assembly according to claim 4, further comprising a splined interconnection between the axle shafts and the side gears whereby the splines of the splined interconnection are divided into a pair of axial-spaced rows of gear teeth on each of said first and second axles and said first and second side gears.

19. (withdrawn) A method of disconnecting a differential assembly of a tandem axle vehicle from a driving torque, comprising the steps of:

disengaging a clutch mechanism upstream of an auxiliary axle of a tandem axle vehicle;

disconnecting first and second axle shafts extending from opposite ends of a differential assembly provided for said auxiliary axle.

20. (withdrawn) The method of claim 19, further comprising the step of simultaneously sliding said first and second axle shafts along an axial direction to disconnect said axle shafts from respective first and second side gears of said differential assembly.

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21. (withdrawn) The method of claim 19, further comprising the step of providing a splined interconnection between the axle shafts and the side gears whereby the splines are divided into a pair of axial-spaced rows of gear teeth.

22. (canceled)